

REMARKS

Reconsideration of this application and the entry of this response is respectfully requested. Claims 14-29 were pending at the issuance of the instant Office Action. Claim 14 and 27-28 stand rejected under 35 U.S.C. section 103(a) as being unpatentable over Dapkus et al. (U.S. Patent No. 6,347,159) ("Dapkus") in view of so-called admitted prior art. Claims 14-20 and 22-29 also stand rejected under 35 U.S.C. section 103(a) as being unpatentable over Dapkus in view of so-called admitted prior art and of Xia (*Chem. Mater.* 1995, Vol. 7, pp. 2332-2337)("Xia"). Claims 14-29 stand rejected under 35 U.S.C. section 103(a) as being unpatentable over Dapkus in view of so-called admitted prior art, Xia, and Akahoshi et al. (U.S. Patent No. 5,294,291)("Akahoshi"). The Applicants respectfully traverse these rejections.

The Federal Circuit reiterated the manner in which obviousness rejections are to be reviewed. Where claimed subject matter has been rejected as obvious in view of a combination of prior art references, "a proper analysis under § 103 requires, *inter alia*, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success." *In re Vaeck*, 947 F.2d 488, 493, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991), citing *In re Dow Chemical Co.*, 837 F.2d 469, 473, 5 U.S.P.Q. 2d 1529, 1531 (Fed. Cir. 1988). As the Federal Circuit emphasized by succinctly summarizing: "Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the Applicants' disclosure." *Id.* Contrary to the Examiner's position, neither Dapkus, Xia, or Akahoshi, alone or in any combination, suggest doing what the Applicants have done.

(a) **Dapkus**

Claims 14 and 27-28 stand rejected under 35 U.S.C. section 103(a) as being unpatentable over Dapkus (primary reference) in view of so-called admitted prior art. The Action alleged that since silver stained DNA detection chips are known and Dapkus

teaches a method for recycling substrate, the present invention as claimed is not patentable. The Applicants respectfully traverse this rejection.

Dapkus relates to base substrates generally coated with semi-conductor coatings, metallic coatings, or both for use in the microelectronic industry. Each coating on such base substrates is layered on a previous coating in successive steps. Typically, when a coating is improperly deposited or is defective in any way, the entire base substrate is discarded. To solve this problem, Dapkus teaches inexpensive methods for removing semi-conductor coatings, metallic coatings, or both coatings from a base substrate. The methods are intended to provide a mechanism for removing improperly deposited or otherwise defective coatings from a base substrate without damaging the base substrate. The recovered base substrate can then be reused for application of new coatings.

The instant invention does not relate to recycling substrates that are coated with multiple layers of semi-conductor coatings, metallic coatings, or both. Rather, the invention relates to methods for recycling silver stained DNA detection chips having bound nanoparticles. The substrates taught by Dapkus are fundamentally different than DNA detection chips. The DNA detection chips comprise a base substrate and nucleic acid (oligonucleotide) probes bound thereto, not layers of coatings like the substrates in Dapkus. Further, the Dapkus substrates are used in the microelectronic industry, for example solar cell modules. The DNA detection chips are used in nucleic acid hybridization assays, in which target nucleic acids, bound to gold nanoparticles, recognize and bind to the nucleic acid probes. Given these differences, it would not have been obvious to use DNA detection chips in place of substrates like solar cell modules in the methods of Dapkus.

Furthermore, the instant invention teaches that silver staining can be used to enhance the sensitivity of DNA detection chips when low concentrations of target nucleic acids are present, thereby providing for facile detection of the bound target nucleic acid (see the specification, for instance, at page 2, line 21 to page 2, line 2). As described in the instant Application, the Applicants surprisingly and unexpectedly discovered methods for removing silver stain from a DNA detection chip without removing the nucleic acid probes from the substrate. Consequently, the invention provides methods for recycling DNA detection chips that can be reused in further nucleic acid hybridization assays.

The Action alleged that “it would have been obvious to use the method of Dapkus to regenerate such silver stained DNA detection chips having bound gold nanoparticles because such chips are useful as taught in the admitted prior art.” However, Dapkus is completely silent with respect to the instant problem of recycling silver-stained DNA chips so that they can be reused for nucleic acid hybridization assays, and there was no art that suggested that Dapkus methods could be used to remove silver stain from DNA detection chips without compromising the integrity of bound nucleic acid probes. Consequently, an ordinary skilled artisan concerned with the problem of recycling silver stained DNA chips would not be motivated by Dapkus’ teachings concerning recycling of solar modules by an etching process to make and use the presently claimed methods with any reasonable expectation of success.

Accordingly, Applicants respectfully submit that rejection on 35 U.S.C §103 grounds has been traversed by their argument herein, and request that this rejection be withdrawn.

(b) Xia

Claims 14-20, and 22-29 stand rejected under 35 U.S.C. section 103(a) as being unpatentable over Dapkus in view of so-called admitted prior art and of Xia (secondary reference). The Action alleged that Xia teaches a useful etchant for silver and that it would have been obvious to employ Xia’s etchant with Dapkus’ method and thus arrive with the claimed invention. The Applicants respectfully traverse this rejection.

Xia does not teach DNA detection chips or methods for removing silver stain from DNA detection chips without removing nucleic acids bound to the chip. Rather, Xia merely relates to an etching solution for use with patterned self-assembled monolayers (SAM) of alkanethiolates on gold. The SAMs in Xia are used as resist to allow microfabrication of circuit boards by etching of gold layers on coated silicon. No resist of any kind is used in a DNA detection chip of the instant invention. Thus, Xia provides no teaching or motivation that the etching methods described therein could be used to remove silver stain from a substrate that comprises bound nucleic acids.

As discussed above, the substrates used in the methods taught by Dapkus were fundamentally different from DNA detection chips. Accordingly, the combination of the

teachings of Dapkus and Xia do not teach the instant invention, do not suggest to a skilled artisan to perform the methods of the instant invention, and do not provide any reason that using methods of Xia would successfully remove silver stain from a DNA detection chip. Consequently, Applicants respectfully submit that rejection on 35 U.S.C §103 grounds has been traversed by their argument herein, and request that this rejection be withdrawn.

(c) **Akahoshi**

Claims 14-29 stand rejected under 35 U.S.C. section 103(a) as being unpatentable over Dapkus in view of so-called admitted prior art, Xia, and Akahoshi (secondary reference). The Examiner alleged that because Akahoshi teaches spraying etchant to a substrate, it would have been obvious to modify Dapkus' method with Akahoshi's spraying technique and Xia's etchant and thus arrive with the claimed invention. The Applicants respectfully traverse this rejection.

Like Xia, Akahoshi adds nothing to Dapkus. Akahoshi merely relates to a process for producing conductive circuit patterns on base metal formed on a substrate to be used for printed circuit board manufacture. The Action indicated that Akahoshi teaches the usefulness of spraying an etchant onto a substrate. However, the substrates in the methods of Akahoshi have nothing in common with a DNA detection chip. Furthermore, Akahoshi does not suggest or teach the presently claimed method for recycling a silver stained DNA chip for reuse in a subsequent hybridization assay.

Thus, an ordinary skilled artisan concerned with the problem of recycling silver stained DNA chips would not be motivated to combine Dapkus' teachings concerning recycling of solar modules by an etching process; Xia's teachings concerning etching of patterned SAM-covered gold films; and Akahoshi's teachings concerning spraying an etchant onto a substrate to make and use the presently claimed methods with any reasonable expectation of success.

Accordingly, the combination of the teachings of Dapkus, Xia, and Akahoshi cannot be properly applied to support a section 103(a) rejection of the claims. Withdrawal of the section 103(b) rejection of claims 14-29 based on the combination of Dapkus, Xia, and Akahoshi is in order and is respectfully requested.

(d) **Conclusion**

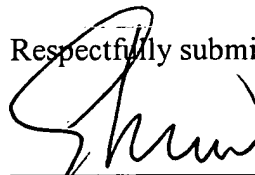
In view of the above discussion, the Applicants respectfully submit that Dapkus, Xia, and Akahoshi, either alone or in any combination, do not teach or suggest the present invention as claimed. Withdrawal of the section 103(a) rejections of the claims therefore respectfully requested.

Prompt consideration and entry of this response is respectfully requested. The Examiner is invited to contact the undersigned representative if the Examiner believes that this would be helpful in expediting the prosecution of this application.

Date: _____

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Respectfully submitted,



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